National Institute of Environmental Health Sciences

Possible impact of rising sea levels on vector-borne infectious diseases

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Abstract:

Background: Vector-borne infectious diseases are a significant cause of human and animal mortality and morbidity. Modeling studies predict that changes in climate that accompany global warming will alter the transmission risk of many vector-borne infectious diseases in different parts of the world. Global warming will also raise sea levels, which will lead to an increase in saline and brackish water bodies in coastal areas. The potential impact of rising sea levels, as opposed to climate change, on the prevalence of vector-borne infectious diseases has hitherto been unrecognised. Presentation of the hypothesis: Mosquito species possessing salinity-tolerant larvae and pupae, and capable of transmitting arboviruses and parasites are found in many parts of the world. An expansion of brackish and saline water bodies in coastal areas, associated with rising sea levels, can increase densities of salinity-tolerant vector mosquitoes and lead to the adaptation of freshwater vectors to breed in brackish and saline waters. The breeding of non-mosquito vectors may also be influenced by salinity changes in coastal habitats. Higher vector densities can increase transmission of vector-borne infectious diseases in coastal localities, which can then spread to other areas. Testing the hypothesis: The demonstration of increases in vector populations and disease prevalence that is related to an expansion of brackish/saline water bodies in coastal areas will provide the necessary supportive evidence. However the implementation of specific vector and disease control measures to counter the threat will confound the expected findings. Implications of the hypothesis: Rising sea levels can act synergistically with climate change and then interact in a complex manner with other environmental and socio-economic factors to generate a greater potential for the transmission of vector-borne infectious diseases. The resulting health impacts are likely to be particularly significant in resource-poor countries in the tropics and semi-tropics. Some measures to meet this threat are outlined.

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Resource Description

Early Warning System: ☑

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

Exposure : ☑

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Sea Level Rise

Geographic Feature: ☑

resource focuses on specific type of geography

Ocean/Coastal

Geographic Location: ☑

resource focuses on specific location

Global or Unspecified

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Mosquito-borne Disease

Mosquito-borne Disease: General Mosquito-borne Disease

Resource Type: ☑

format or standard characteristic of resource

Review

Timescale: ☑

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content